

Patent Claims

- 5 1. A sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) having
- a first capacitor (C2), which comprises a first electrically conductive area (12.1; 32.1; 52; 72; 82.1; 142.n; 152.1, 152.2, 152.n; 172; 192), a second electrically conductive area (11; 31; 53; 73; 83; 10 143; 153.1, 153.2, 153.n; 173), and a dielectric layer (13; 33; 124; 174),
 - a conductive absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 15 503), which has a conductive connection to the first area (12.1; 32.1; 52; 72; 82.1; 142.n; 152.1, 152.2, 152.n; 172; 192) of the first capacitor (C2),
 - in AC voltage generator (G), for coupling an AC voltage signal (s1(t)) into the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 20 402; 503),
 - a sensor amplifier (A) for amplifying an output signal (s2(t)), which may be tapped at the second area (11; 31; 53; 73; 83; 143; 153.1, 153.2, 153.n; 173) of the first capacitor (C2), wherein the sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 25 170; 190; 200; 300; 400; 500) is designed in such a way that
 - the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503) forms an additional capacitor (C3), whose effective capacitance is changeable, when an object (18; 38; 148) approaches, and
 - the output signal (s2(t)) experiences damping, which is detectable, 30 due to this effective capacitance.

2. The sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) according to Claim 1, characterized in that the first capacitor (C2) is positioned in relation to the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503) in such a way that a leakage field of the first capacitor (C2) may only be influenced insignificantly by the object (18; 38; 148), the first capacitor (C2) preferably being positioned behind a side of the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503), which faces away from the first side of the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503).
3. The sensor device (30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) according to Claim 1 or 2, having a second capacitor (C1), which comprises a first electrically conductive area (32.3; 52; 72; 82.1; 142.1; 152.1, 152.2, 152.n; 172; 192), a second electrically conductive area (41; 51; 71; 81; 141; 151.1, 151.2, 151.n; 183), and a dielectric layer (43; 174; 194), wherein the first area (32.3; 52; 72; 82.1; 142.1; 152.1, 152.2, 152.n; 172; 192) of the second capacitor (C1) has an electrically conductive connection to the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503), and the second area (41; 51; 71; 81; 141; 151.1, 151.2, 151.n; 183) of the second capacitor (C1) is electrically connected to the AC voltage generator (G).
4. The sensor device (30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) according to Claim 3, wherein the AC voltage signal ($s_1(t)$) is coupled in via the second capacitor (C1).
5. The sensor device (30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) according to Claim 3 or 4, wherein the second capacitor (C1) is preferably positioned behind a side of the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503) which faces away from the first

side of the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503).

6. The sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190;
5 200; 300; 400; 500) according to one of the preceding claims,
characterized in that the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3;
142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503) has an ar-
bitrary two-dimensional or three-dimensional shape.
- 10 7. The sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190;
200; 300; 400; 500) according to one of the preceding claims,
characterized in that the absorption area (12.2; 32.2; 52; 72; 82.1, 82.2, 82.3;
142.1; 142.2; 142.n; 152.1, 152.2, 152.n; 172; 192; 301; 402; 503) is laid out
so that its shape and/or size is changeable, the change preferably occurring in a
15 step before mounting of the sensor device.
8. The sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190;
200; 300; 400; 500) according to one of the preceding claims,
characterized in that an insulation layer (14, 15; 34, 35; 194, 195; 401; 501) is
20 positioned on a first side of the absorption area (12.2; 32.2; 52; 62; 72; 82.1,
82.2, 82.3; 142.2; 152.1, 152.2, 152.n; 172; 192; 402; 503).
9. The sensor device (80; 140; 150) according to one of the preceding
claims,
25 characterized in that the absorption area is divided into two or more partial areas
(82.1, 82.2, 82.3; 142.1; 142.2; 142.n; 152.1, 152.2, 152.n), the partial areas
either having a conductive connection to one another or a spacing (dL) being
provided between the partial areas.
- 30 10. The sensor device (90) according to one of the preceding claims,
characterized in that a shielding area (112) is provided, which preferably may be
connected to ground or mass.

11. The sensor device (90) according to Claim 10, characterized in that the shielding area (112) is decoupled from the absorption area (32) by capacitors (41, 113, 112; 31, 104, 112).

5 12. The sensor device (120) according to one of Claims 1 through 9, characterized in that a further absorption area (122) and two further capacitors (C1', C2') are provided, the entire construction of the sensor device (120) preferably being symmetrical to a central plane.

10 13. The sensor device (10; 30; 90; 120; 140; 150) according to one of the preceding claims, characterized in that

- n absorption areas (152.1, 152.2, 152.n) are positioned distributed in a plane or in space,
- 15 - the AC voltage signal (s1(t)) may be coupled into each of the n absorption areas (152.1, 152.2, 152.n),
- n sensor amplifiers (160.1, 160.2, 160.n) are provided, and
- an output stage (161.1, 161.2, 161.n) is provided behind each of the n sensor amplifiers (160.1, 160.2, 160.n),

20 n being a whole number greater than 1.

14. The sensor device (10; 30; 90; 120; 140; 150) according to one of Claims 1 through 12,

25 characterized in that one or more of the following elements is connected downstream from the sensor amplifier (20; 40; 100; 130; 160.1, 160.1, 160.n):

- a filter (201),
- an AC/DC converter (202),
- an analog/digital converter (161.1, 161.2, 161.n),
- a microprocessor (162; 204) or computer.

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15. The sensor device (10; 30; 90; 120; 140; 150) according to one of Claims 1 through 12,
characterized in that an attenuated AC voltage signal ($s_1(t)$) is coupled into a fluid medium, the output signal ($s_2(t)$) experiencing an amplification which may be
5 differentiated from the damping.
16. An installation having a sensor device (10; 30; 50; 70; 80; 90; 120; 140; 150; 170; 190; 200; 300; 400; 500) according to one of Claims 1 through 15.
- 10 17. The installation according to Claim 16,
characterized in that it is a sanitary installation, building installation, kitchen installation, door installation, security installation, or elevator installation.
18. The installation according to Claim 16,
15 characterized in that it is an installation (500) for level measurement or leak recognition.
19. The installation according to Claim 16,
characterized in that it is an installation (400) for detecting a urine stream.
- 20 20. The installation according to Claim 16,
characterized in that a water supply tap (301) is used as the absorption area.